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09/925,031	08/08/2001	Giovanni Di Bernardo	854063.646	2519

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EXAMINER
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POPHAM, JEFFREY D

ART UNIT	PAPER NUMBER
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2137

DATE MAILED: 07/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/925,031

Applicant(s)

DI BERNARDO ET AL.

Examiner

Jeffrey D. Popham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2 and 4-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received:

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

***Remarks***

Claims 1, 2, and 4-47 are pending.

***Response to Arguments***

1. Applicant's arguments filed 4/19/2006 have been fully considered but they are not persuasive.

Applicant argues that neither Dachzelt or Bianco teach or suggest confusing the characters by adding a string of the characters to strings of confusing characters obtained by multiplying strings of previously confused characters by respective multiplication constants. This is found in section 3.4, formula 3 of Dachzelt, however. Definitions for each variable can be found in Page IV-518, Section 1 and Page IV-519, Section 3.4. A coefficient ( $c_j$ ) is multiplied with the previous ciphertext ( $s_{t,j}$ ). The result is then added to the plaintext ( $i_t$ ). As can be seen, this involves confusing the characters by adding a string of the characters (plaintext) to strings of confusing characters obtained by multiplying strings of previously confused characters (previous ciphertext) by respective multiplication constants (coefficient).

Applicant also argues that neither Dachzelt or Bianco teach or suggest diffusing the resulting confused document by performing an EXOR operation on it in combination with chaotic characters to obtain an encrypted document. Dachzelt teaches the combining of ciphers through means of cascading, serial, and parallel composition. This means that the output data from one cipher (such as that discussed above) is input to another cipher in order to form the final ciphertext. Bianco teaches the creation of

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chaotic characters (Column 4, line 59 to Column 5, line 24), as well as performing an EXOR operation on input data in combination with the chaotic characters (keystream) to obtain encrypted data (Column 9, Appendix I).

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/19/2006 has been entered.

### ***Claim Objections***

2. Claim 12 is objected to because of the following informalities: Claim 12 is dependent upon claim 3, which should apparently be dependent upon claim 1, since claim 3 is cancelled. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 4-19, 21-42, and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dachzelt (Dachzelt et al., "Chaotic Versus Classical Stream Ciphers – A Comparative Study", in *Proceedings of the IEEE International Symposium on Circuits and Systems*, Monterey, CA, May 31 – June 3, 1998, pp. 518-521) in view of Bianco (U.S. Patent 5,048,086).

Regarding Claim 1,

Dachzelt discloses a method for protecting the contents of an electronic document having a plurality of strings of characters to be encrypted, comprising:

Confusing characters belonging to an electronic input document through an invertible scrambler to obtain a confused document, the confused document comprising a plurality of confused characters, and the confusing step comprises adding each string of characters to be encrypted to strings of confused characters obtained by multiplying strings of previously confused characters by respective multiplication constants (Page IV-519, Section 3.4; and Page IV-520, Figure 2); and

Using multiple encryption algorithms in cascade (Page IV-519, Section 4.2), but does not disclose diffusing the confused document by performing an EXOR operation on it in combination with chaotic characters to obtain an encrypted document.

Bianco, however, discloses diffusing a document (which is the confused document in the combination) by performing an EXOR operation

on it in combination with chaotic characters to obtain an encrypted document (Column 4, line 59 to Column 5, line 24; and Column 9, Appendix I). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to incorporate the chaotic encryption system of Bianco into the encryption system of Dachsel in order to increase robustness of the data against recovery by cryptanalysis, thus making the system more secure (Column 4, lines 8-48).

Regarding Claim 25,

Claim 25 is a method claim that is broader than method claim 1 and is rejected for the same reasons.

Regarding Claim 2,

Dachsel as modified by Bianco discloses the method of claim 1, in addition, Dachsel discloses that the confusing step comprises carrying out operations defined within a Galois field (Page IV-519, Section 3.1).

Regarding Claim 26,

Claim 26 is a method claim that is broader than method claim 2 and is rejected for the same reasons.

Regarding Claim 4,

Dachsel as modified by Bianco discloses the method of claim 1, in addition, Dachsel discloses that before being multiplied by the multiplication constants, the strings of previously confused characters are delayed (Page IV-519, Section 3.4).

Regarding Claim 27,

Claim 27 is a method claim that is broader than method claim 4 and is rejected for the same reasons.

Regarding Claim 5,

Dachsel as modified by Bianco discloses the method of claim 1, in addition, Dachsel discloses that the confused document comprises a plurality of strings of confused characters and using the confused characters as input to another cipher (Page IV-519, Sections 3.4 and 4.2; and Page IV-520, Figure 2); and Bianco discloses that the diffusing step comprises generating chaotic characters through a chaos generator and mixing the strings of input characters with the chaotic characters (Column 4, line 59 to Column 5, line 24).

Regarding Claim 28,

Claim 28 is a method claim that is broader than method claim 5 and is rejected for the same reasons.

Regarding Claim 6,

Dachsel as modified by Bianco discloses the method of claim 5, in addition, Bianco discloses that the mixing step comprises performing an XOR operation (Column 4, line 59 to Column 5, line 24; and Column 9, Appendix I).

Regarding Claim 29,

Claim 29 is a method claim that is broader than method claim 6 and is rejected for the same reasons.

Regarding Claim 7,

Dachselt as modified by Bianco discloses the method of claim 5, in addition, Bianco discloses that the chaos generator implements the function:

$$f_k(x) = Kx(1 - x). \text{ (Column 3, lines 24-43).}$$

Regarding Claim 30,

Claim 30 is a method claim that is broader than method claim 7 and is rejected for the same reasons.

Regarding Claim 8,

Dachselt as modified by Bianco discloses the method of claim 1, in addition, Dachselt discloses:

a) loading encryption keys into shift registers of the invertible scrambler (Page IV-519, Sections 3.3 and 3.4; and Page IV-520, Figure 2);

b) acquiring an input character string (Page IV-519, Section 3.4; and Page IV-520, Figure 2);

c) calculating a diffused character string using the input character string, the encryption keys, and the contents of the shift registers (Page IV-519, Section 3.4);



d) feeding the diffused character string to the shift registers, and issuing a command for a shift operation for the shift registers (Page IV-519, Section 3.4; and Page IV-520, Figure 2);

e) repeating b), c), and d) a preset number of times to obtain a plurality of confused character strings (Page IV-519, Section 3.4; and Page IV-520, Figure 2); and

Bianco discloses loading an initial chaotic value into a chaotic-value register (Column 4, line 63 to Column 5, line 5);

f) calculating a subsequent chaotic value, using the contents of the chaotic value register (Column 5, lines 5-11);

g) adding the plurality of confused character strings to the subsequent chaotic value to obtain an encrypted word (Column 5, lines 12-24);

h) storing the subsequent chaotic value in the chaotic-value register (Column 5, lines 12-24); and

i) repeating the encryption process on subsequent blocks of data (Column 5, lines 12-24).

Regarding Claim 31,

Claim 31 is a method claim that is broader than method claim 8 and is rejected for the same reasons.

Regarding Claim 9,

Dachsel as modified by Bianco discloses the method of claim 8, in addition, Dachsel discloses that c) uses the following relation:

$$s(t) = IN(t) \oplus \sum_{j=0}^3 c_j \oplus s(t - j)$$

In which  $IN(t)$  is the input character string,  $c_j$  are the encryption keys,  $s(t - j)$  are the contents of the shift registers, and  $s(t)$  is the diffused character string (Page IV-519, Section 3.4; and Page IV-520, Figure 2).

Regarding Claim 32,

Claim 32 is a method claim that is broader than method claim 9 and is rejected for the same reasons.

Regarding Claim 10,

Dachsel as modified by Bianco discloses the method of claim 8, in addition, Bianco discloses that f) uses the following relation:

$$f_k(x) = Kx(1 - x);$$

where  $K$  is a bifurcation parameter of a chaotic system (Column 3, lines 24-43).

Regarding Claim 33,

Claim 33 is a method claim that is broader than method claim 10 and is rejected for the same reasons.

Regarding Claim 11,

Dachsel as modified by Bianco discloses the method of claim 1, in addition, Bianco discloses decrypting an encrypted document by mixing it with the chaotic characters (Column 5, lines 25-41); and Dachsel

discloses unscrambling the document through an unscrambler opposite to the scrambler (Page IV-519, Section 3.4; and Page IV-520, Figure 2).

Regarding Claim 34,

Claim 34 is a method claim that is broader than method claim 11 and is rejected for the same reasons.

Regarding Claim 12,

Dachsel as modified by Bianco discloses the method of claim 1, in addition, Dachsel discloses that an encrypted document comprises a plurality of encrypted character strings (Page IV-519, Section 3.4; and Page IV-520, Figure 2); the method comprising decrypting the encrypted document through a first and a second decryption operation, in cascade (Page IV-519, Section 4.2; and Page IV-520, Figure 2); the second decryption operation supplying a plurality of decrypted character strings (Page IV-519, Section 3.4; and Page IV-520, Figure 2); the second decryption operation comprising an unscrambling step by subtracting each predecrypted character string from feedback character strings obtained by multiplying the decrypted character strings by the multiplication constants (Page IV-519, Section 3.4; and Page IV-520, Figure 2); and Bianco discloses the first decryption operation comprising a mixing step wherein the encrypted character strings are mixed with the chaotic characters to obtain a plurality of predecrypted character strings (Column 5, lines 25-41).

Regarding Claim 35,

Claim 35 is a method claim that is broader than method claim 12 and is rejected for the same reasons.

Regarding Claim 13,

Dachsel discloses a device for protecting the contents of an electronic document having a plurality of strings of characters to be encrypted, comprising:

A confusion block for confusing an electronic input document, the confusion block comprising an invertible scrambler that supplies a confused document, the confused document comprising a plurality of confused characters, and the confusing step comprises adding each string of characters to be encrypted to strings of confused characters obtained by multiplying the strings of previously confused characters by respective multiplication constants (Page IV-519, Section 3.4; and Page IV-520, Figure 2); and that another cipher block is cascade-connected to the confusion block (Page IV-519, Section 4.2), but does not disclose that this second cipher block is a diffusion block comprising EXOR mixing means for mixing the confused document with chaotic characters, which supply an encrypted document.

Bianco, however, discloses a diffusion block cascade-connected to the confusion block, the diffusion block comprising EXOR mixing means for mixing the confused document with chaotic characters, which supply

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an encrypted document (Column 4, line 59 to Column 5, line 24; and Column 9, Appendix I). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to incorporate the chaotic encryption system of Bianco into the encryption system of Dachsel in order to increase robustness of the data against recovery by cryptanalysis, thus making the system more secure (Column 4, lines 8-48).

Regarding Claim 36,

Claim 36 is a device claim that is broader than device claim 13 and is rejected for the same reasons.

Regarding Claim 14,

Dachsel as modified by Bianco discloses the device of claim 13, in addition, Dachsel discloses that the scrambler comprises operators acting within a Galois field (Page IV-519, Section 3.1).

Regarding Claim 37,

Claim 37 is a device claim that is broader than device claim 14 and is rejected for the same reasons.

Regarding Claim 15,

Dachsel as modified by Bianco discloses the device of claim 13, in addition, Dachsel discloses that the scrambler comprises an adding element having a first and a second input, the first input receiving a string of characters to be encrypted that belong to the electronic input document; a plurality of shift registers cascade-connected to one another and to the

adding element; a plurality of multiplier elements, each having an input connected to an output of a respective shift register and to an own output; a plurality of adding nodes cascade-connected, each adding node having an input connected to the output of a respective multiplier element, an adding node arranged upstream and having a second input connected to a last multiplier element of the multiplier elements and an adding node arranged downstream and having an output connected to the second input of the adding element (Page IV-519, Section 3.4; and Page IV-520, Figure 2).

Regarding Claim 38,

Claim 38 is a device claim that is broader than device claim 15 and is rejected for the same reasons.

Regarding Claim 16,

Dachsel as modified by Bianco discloses the device of claim 13, in addition, Bianco discloses that the mixing means comprise an EXOR logic circuit and the diffusion block comprises a chaos generator (Column 4, line 59 to Column 5, line 24; and Column 9, Appendix I).

Regarding Claim 39,

Claim 39 is a device claim that is broader than device claim 16 and is rejected for the same reasons.

Regarding Claim 17,

Dachselt as modified by Bianco discloses the device of claim 16, in addition, Bianco discloses that the chaos generator implements the following function:

$$f_k(x) = Kx(1 - x);$$

where K is a bifurcation parameter of a chaotic system (Column 3, lines 24-43).

Regarding Claim 40,

Claim 40 is a device claim that is broader than device claim 17 and is rejected for the same reasons.

Regarding Claim 18,

Dachselt as modified by Bianco discloses the device of claim 13, in addition, Bianco discloses integrating all of the components of the encryptor in one first chip (Column 6, lines 18-53).

Regarding Claim 41,

Claim 41 is a device claim that is broader than device claim 18 and is rejected for the same reasons.

Regarding Claim 19,

Dachselt as modified by Bianco discloses the device of claim 13, in addition, Bianco discloses integrating all of the components of the decryptor in a second chip (Column 6, lines 18-53).

Regarding Claim 42,

Claim 42 is a device claim that is broader than device claim 19 and is rejected for the same reasons.

Regarding Claim 21,

Dachselt discloses a method to protect the contents of an electronic document comprising:

Acquiring encryption keys (Page IV-519, Sections 3.3 and 3.4; and Page IV-520, Figure 2);

Acquiring input character strings (Page IV-519, Section 3.4; and Page IV-520, Figure 2);

Generating confused character strings by calculation using the input character strings, the encryption keys, and previous confused character strings to obtain a confused word (Page IV-519, Section 3.4; and Page IV-520, Figure 2);

But does not disclose acquiring an initial chaotic value; calculating a current chaotic value from the initial chaotic value; and calculating an encrypted word by performing an EXOR operation on the confused word and the current chaotic value to obtain an encrypted word.

Bianco, however, discloses acquiring an initial chaotic value (Column 4, line 63 to Column 5, line 5); calculating a current chaotic value from the initial chaotic value (Column 5, lines 5-11); and calculating an encrypted word by performing an EXOR operation on the confused word and the current chaotic value to obtain an encrypted word (Column 5, lines



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12-24; and Column 9, Appendix I). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to incorporate the chaotic encryption system of Bianco into the encryption system of Dachself in order to increase robustness of the data against recovery by cryptanalysis, thus making the system more secure (Column 4, lines 8-48).

Regarding Claim 44,

Claim 44 is a method claim that is broader than method claim 21 and is rejected for the same reasons.

Regarding Claim 22,

Bianco discloses decrypting the encrypted word by adding the encrypted word to a chaotic value identical to the chaotic value (Column 5, lines 25-41);

Dachself discloses subtracting a word from a previously decrypted word using an unscrambler element having a structure similar to that of the scrambler that generated the confused word, and further using identical encryption keys. (Page IV-519, Section 3.4; and Page IV-520, Figure 2).

Regarding Claim 45,

Claim 45 is a method claim that is broader than method claim 22 and is rejected for the same reasons.

Regarding Claim 23,

Dachselft discloses a method for protecting the contents of an electronic document comprising:

Loading encryption keys into shift registers of an invertible scrambler (Page IV-519, Sections 3.3 and 3.4; and Page IV-520, Figure 2);

Acquiring an input character string (Page IV-519, Section 3.4; and Page IV-520, Figure 2);

Calculating a confused character string using the input character string, the encryption keys, and the contents of the shift registers and the following relation:

$$s(t) = IN(t) \oplus \sum_{j=0}^3 c_j \oplus s(t - j)$$

In which  $IN(t)$  is the input character string,  $c_j$  are the encryption keys,  $s(t - j)$  are the contents of the shift registers, and  $s(t)$  is the diffused character string ( ); feeding the confused character string to the shift registers and issuing a command for a shift operation for the shift registers (Page IV-519, Section 3.4; and Page IV-520, Figure 2);

Repeating the acquisition of the input character string, calculating the confused character string, and feeding the confused character string to the shift registers a predetermined number of times to obtain a plurality of confused character strings (Page IV-519, Section 3.4; and Page IV-520, Figure 2);

But does not disclose Loading an initial chaotic value into a chaotic-value register; calculating a subsequent chaotic value using the contents of the chaotic-value register; and performing an EXOR operation on the subsequent chaotic value and the plurality of confused character strings to obtain an encrypted word. ,

Bianco, however, discloses loading an initial chaotic value into a chaotic-value register (Column 4, line 63 to Column 5, line 5); calculating a subsequent chaotic value using the contents of the chaotic-value register (Column 5, lines 5-11); and performing an EXOR operation on the subsequent chaotic value and the plurality of confused character strings to obtain an encrypted word (Column 5, lines 12-24; and Column 9, Appendix I). It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to incorporate the chaotic encryption system of Bianco into the encryption system of Dachsel in order to increase robustness of the data against recovery by cryptanalysis, thus making the system more secure (Column 4, lines 8-48).

Regarding Claim 46,

Claim 46 is a method claim that is broader than method claim 23 and is rejected for the same reasons.

Regarding Claim 24,

Bianco discloses decrypting the encrypted word by adding the encrypted word to a chaotic value identical to the chaotic value (Column 5, lines 25-41);

Dachselt discloses subtracting a word from a previously decrypted word using an unscrambler element having a structure similar to that of the scrambler that generated the confused word, and further using identical encryption keys (Page IV-519, Section 3.4; and Page IV-520, Figure 2).

Regarding Claim 47,

Claim 47 is a method claim that is broader than method claim 24 and is rejected for the same reasons.

4. Claims 20 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dachselt in view of Bianco, further in view of Camilletti (U.S. Patent 5,458,912):

Regarding Claim 20,

Dachselt as modified by Bianco discloses the device of claim 18, but does not disclose that the first chip and a second chip each comprise a coating metal layer covering the components of the chip.

Camilletti, however, discloses that the chips each comprise a coating metal layer covering the components of the chip (Column 2, lines 12-19; Column 3, lines 27-35; and Column 5, lines 55-64). It would have been obvious to one of ordinary skill in the art at the time of applicant's

invention to incorporate the tamper-proof electronic coating of Camilletti into the encryption system of Dachsel as modified by Bianco in order to inhibit examination and/or reverse engineering of the chip, such that an attempt to examine the components of the chip will result in destruction of the chip.

Regarding Claim 43,

Claim 43 is a device claim that is broader than device claim 20 and is rejected for the same reasons.

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey D. Popham whose telephone number is (571)-272-7215. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emmanuel Moise can be reached on (571)272-3865. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Jeffrey D Popham  
Examiner  
Art Unit 2137

  
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